**"BLEBBY" TERRAIN AND DOMES ON THE NORTHERN PLAINS OF MARS: EVIDENCE OF ANCIENT ICE AGES?** W.H. Farrand[1] and M.D. Lane[2], [1]Space Science Institute, 4750 Walnut St. #205, Boulder, CO 80301, farrand@spacescience.org, [2]Planetary Science Institute, Tucson, AZ.

**Introduction:** In recent years, a number of researchers have recognized signs of past glacial activity on Mars and features that could be extant rock glaciers [1,2]. There has also been the recognition of "pasted on" terrains which are interpreted as dust-covered snow or ice deposits [3]. Many of these features are attributed to relatively recent (within the last several million years) periods of high obliquity that led to Martian ice ages [4]. A reasonable question is what evidence might exist for more ancient ice ages?

**Unusual Northern Plains Terrain:** We have undertaken an examination of unusual terrains and landforms on the northern plains of Mars, focusing primarily Utopia and Acidalia Planitiae and their surroundings [5]. Among the unusual terrains that we have recognized is what we call "blebby terrain", an example of which is provided in **Fig. 1**. Examples of the terrain that we have been examining occur on the western border of Utopia Planitia. The example in **Fig. 1** is at 44° N, 67° E. As is shown in **Fig. 1b**, the terrain is bright in nighttime THEMIS images relative to the background. Thermal inertia (TI) values extracted from the THEMIS data [6] indicate that the higher TI portions of the terrain reach values on the order of 700 $J/m^2s^{½}K$, whereas the background plains have TI values in the 200 to 400 $J/m^2s^{½}K$ range. The higher TI "blebs" are also higher in elevation relative to the background plains by 100 m or more. Examination of multispectral THEMIS Day IR data do not show any color anomalies on surface units related to the blebby terrain. Likewise, in the visible and very near infrared, examination of HRSC color data do not show any color anomalies over the blebby terrain. Higher spatial resolution THEMIS VIS data indicate that the "blebs" have rougher textures than the background plains. The blebby terrain appears to have a crater population commensurate with the background plains, and this portion of Utopia was mapped by [7] as being Hesperian in age. Near the blebby terrain there are other unusual features including domes that are also higher in TI than the background plains, with mean values of 500 $J/m^2s^{½}K$. (**Fig. 2**).

**Nature of the Blebby Terrain:** The occurences of blebby terrain west of Utopia and north of Nilosyrtis Mensae occur near craters and slopes with textured and "pasted on" terrain which have been interpreted as dust-covered snow and ice deposits. Occurences of blebby terrain also are present immediately to the northeast of Deuteronilus and Protonilus Mensae. These regions were cited by [8] as areas with glacial features. The occurrence of the blebby terrain in association with the glacial features at this particular location is suggestive that snow or ice might have played a role in the formation of the terrain. However, the terrain does not have a morphology that is easily relatable to any terrestrial glacial or periglacial terrains. We propose that this terrain might be the result of more ancient snow and ice accumulations than those suggested for the Deuteronilus Mensae region [8]. We hypothesize that snow and ice might have built up in this region during more ancient excursions of high obliquity. That snow and ice would have been buried by aeolian deposits of dust and, over time, diffusion of water from the ice could have acted to cement the drift deposits and create areas with greater induration and consequently higher thermal inertia. We suggest that this diffusion and cementation process was not entirely effective and thus some areas became better cemented than others. Subsequent aeolian stripping has removed the less-indurated portions of the terrain leaving the irregularly shaped high thermal inertia patches seen today. The nearby domes (**Fig. 2**) might be emerging pingos; some of which have not caused discernable topographic expressions in the area (**Fig. 2b**). If the domes are ice-cored, their higher thermal inertia might be the result of the same process of water diffusion and sediment induration that is described above.

**References:** [1] Head J.W. et al. (2005) *Nature, 434,* 346–351. [2] Head J.W. and D.R. Marchant. (2003) *Geology*, *31*, 641-644. [3] Christensen P.R. (2003) *Nature*,*422*, 45–48. [4] Head J.W. et al. (2003) *Nature*, *426*, 797-802. [5] Farrand W.H. and M.D. Lane (2006) *LPS XXXVII*, #1499. [6] Piatek J.L. and J.E. Moersch (2006) *LPS XXXVII*, *#1158*. [7] Tanaka K.L. et al. (2005) USGS Sci. Inv. Map 2888. [8] Head J.W. et al. *EPSL*, *241*, 663-671.

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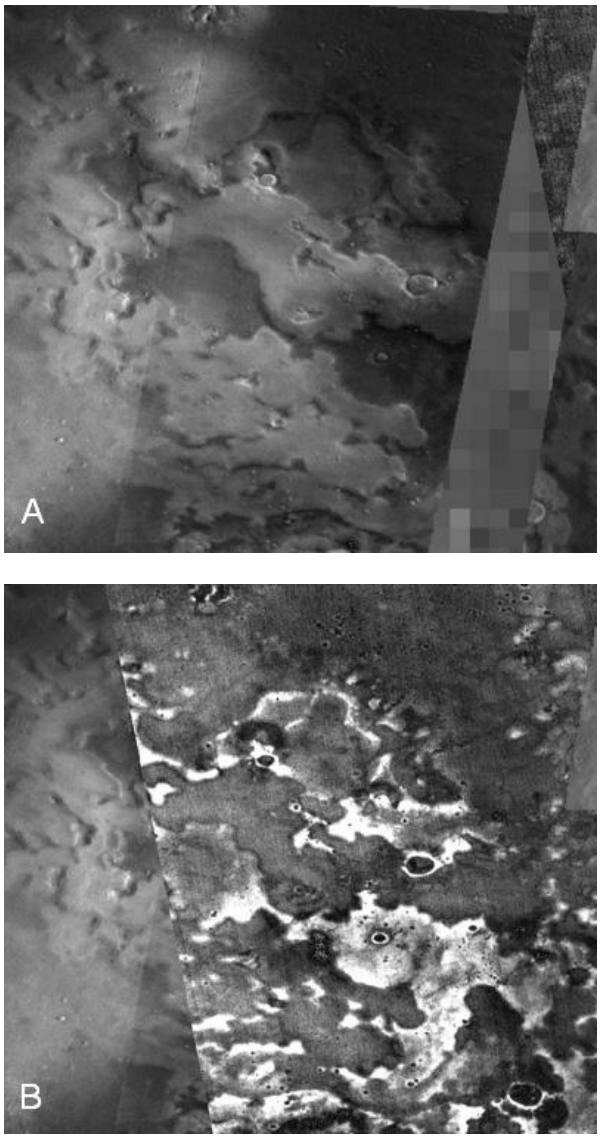


**Figure 1**. **A.** Section from a GIS screen showing portions of THEMIS Day IR scenes I01271008 and I03468012 showing blebby terrain as dark. **B**. Same area showing overlay of parts of Night THEMIS IR scenes I06308014 and I05559020.

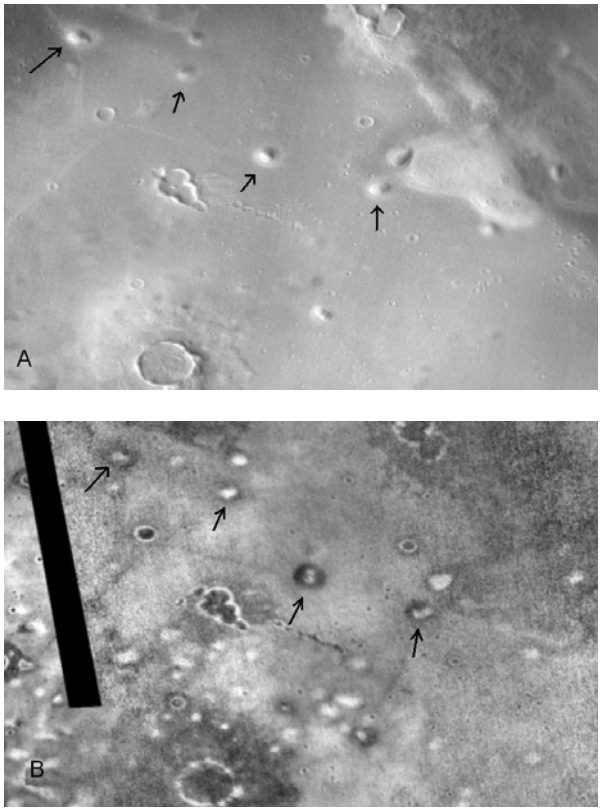


**Figure 2**. **A**. THEMIS Day IR imagery showing domes (indicated by arrows). **B**. THEMIS Night IR imagery showing domes that appear bright relative to the background. Note other dome-sized higher apparent TI patches that lack apparent topographic expression in the Day IR image.